

## **NeSA Assessment Administration Mode: Online vs. Paper**

### **Analysis of 2011 Reading and Math Results**

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#### **Overview:**

Nebraska State Accountability (NeSA) assessments were designed to be administered to students online by computer. To allow time to implement the resources and procedures needed for online administration, during the last two years schools have been allowed to choose whether to administer by computer or traditional paper and pencil tests. Online and paper tests for each grade and subject have the same items and are scored as equivalent forms.

Our decision to treat online and paper as equivalent forms was based on a variety of factors. Other states that have implemented online versions of their test have generally found the results to be equivalent to their paper tests. In addition, the Center for Assessment of Learning (CAL), our contractor for the NeSA online assessments, conducted an item analysis of the 2010 NeSA reading results. They found that there appeared to be no mode effect at the item level. This analysis was presented to the National Technical Advisory Committee (TAC) on October 19, 2010. The TAC's recommendation was to conduct a more comprehensive analysis of the effect of mode of administration on total scores.

Using the 2011 reading and mathematics NeSA assessment results, NDE analyzed the mode effect at all grades. The results indicate a slight advantage for the online mode at some grades. As a result of the analysis, NDE is recommending that the Board change policy to require online administration except for the cases in which a student's individual needs require a paper test.

#### **Analysis of NeSA Administration Mode:**

**Research Design:** An ideal study of the mode effect would involve random assignment of schools and students to groups that take the test online or by paper. However such a design would be a hardship for schools. Therefore, a non-experimental design was selected for the

comparability study. Each school was allowed to make a choice to administer online or paper and pencil assessments. Schools could make separate decisions for reading and mathematics, Schools that chose online testing could administer paper tests to selected students based on individual student need. In 2011, we found that 119729 students (81%) took the reading test online while 27885 (19%) took paper tests. For mathematics, schools choose to administer fewer tests online (86157 or 59%) compared with 61039 (41%) paper tests.

**Method:** As noted above, we don't have random assignment of online or paper tests to students. Therefore, any differences between modes might be due to differences in the ability of students rather than the effect of mode of administration. In our analysis we attempted to control for this by adjusting for factors that usually contribute to the level of achievement. We also accounted for the clustering of students into schools. The method used is called Hierarchical Linear Model (HLM – Multilevel).

**Variables for HLM Analysis:** The analysis utilized a two-level hierarchical linear model of achievement. The dependent variable in the analysis was the student's scale score on the NeSA-M assessment. To account for potential student differences, explanatory variables (gender, free and reduced lunch, special education, race/ethnicity, and English Language Learner) were included in the analysis at the student level. The student's 2011 scale score on the other subjects (ie, math for the reading analysis and reading for the mathematics analysis) was included to control for general student ability. While highly correlated, scores in another subject act as indicator of general student ability, especially for students with disabilities and English language learners.

School level variables such as percentages of students in the above categories and school size were found to increase model fit slightly, but are not included in this analysis to keep the model simple. Therefore the clustering of student scores within school is accounted for, but no explanatory between school effects were modeled.

**Results:** After considering all the explanatory variables, we computed the effect of online vs. paper mode of administration. Table 1 below shows the effects for each grade level. The effect in the first table is due to the administrative mode while controlling for the other variables. For example, at grade 3, there appears to be no difference between online and

paper modes of test administration. However for math, it appears that there is a 2.9 scale score point advantage to take the test online. (Note that because analysis is based on a non-experimental study, we have no basis for altering our interpretations of the 2011 results.)

**Table 1: HLM Estimates of Effect of Online Administration**

Grade	Online Effect	
	Reading	Mathematics
3 <sup>rd</sup>	No Difference	2.9
4 <sup>th</sup>	5.7	No Difference
5 <sup>th</sup>	5.0	No Difference
6 <sup>th</sup>	3.8	No Difference
7 <sup>th</sup>	7.7	3.0
8 <sup>th</sup>	3.4	4.8
11 <sup>th</sup>	No Difference	5.1

### **Conclusion:**

Although the calculated effects are not large nor consistent across all grades, where there is a significant effect, the advantage is for online test administration. If there is a difference, best practice is to require a single mode. These results were presented to the TAC in November 2011. After review, Dr. Roschewski proposed to Commissioner Breed that policy be changed “to limit the paper/pencil test takers to only those students who have an Individual Educational Plan (IEP) that would require paper/pencil testing as an accommodation.” This proposal was presented to the Board of Education in December and the Board is scheduled to take action in January.